

EXHIBIT C

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Final Analysis Forensics

Death Investigation Criminalistics Forensic Analysis

June 29, 2006

John Parkins, Jr.
Richards Layton & Finger
920 North King Street
Wilmington Delaware 19801

*Reference: Smith v. Wilmington Police Department
Final Analysis Forensics Case #06-0516*

Dear Mr. Parkins:

The following represents my report, including my opinions to date about the above-referenced case. As with any scientific endeavor, should additional information be provided to me beyond what I have listed as 'Information Reviewed' in Appendix I, I reserve the right to revise my report, reassess these opinions, and reevaluate their scientific bases upon completing my review of this or any new data. Appendix II provides my lab drawings with notes, my evidence photos, and my XRF spectra, each of which was used as part of my scientific investigation.

Please refer to my CV, attached as Appendix III, for relevant training and experience For counsel's reference, I also supply the relevant details of my past courtroom and deposition appearances from 1997, current to the date of this report. As you know, I have never consulted with you, or testified as your witness on any previous case.

In my independent practice of forensic science and forensic medicine, I present scientific results based only upon the available evidence. The results are developed through the application of sound scientific and medical methods applied to all the relevant data according to the best of my ability completely without regard for their potential adversarial consequences.

Necessary Preliminaries – Clarification of Terms and Activities

"Crime Scene" or "Event" Reconstruction & Scientific Method

A crime scene or event analysis and reconstruction logically link a detailed series of scientific *explanations* to provide an understanding of the sequence of events leaving physical evidence. Each explanation is developed, linked, and evaluated by applying *the scientific method* to this available data.* This process involves proposing, testing, and evaluating explanatory connections among the physical evidence found to be related to these events. The purpose of the analysis is to determine the *best explanation* of these related events.

Caveats & Required Components

1. Such analyses rely upon the availability of *all* of the evidence, and the analyst's unbiased application of logical scientific methods. Data includes statements, reports, diagrams, photographs and physical evidence. The ability to apply proper logical methods develops in the analyst through relevant education, training, and experience but involves skills not unfamiliar to the average person. ** Thus, jurors, attorneys, and the court should be able to understand the logic behind the reconstruction
2. Such analyses also may face logical limitations, which must be recognized and explained by the analyst as part of the reconstruction. *No reconstruction can explain every element of an event.* Many sequences may escape scientific detection, or if detected, may supply no logical grounds for inclusion
3. Such analyses must remain logically open to the discovery of new data that may prove to be relevant to the events, and as such, may supply new evidence. In that event, the analyst must reserve the right to consider this new evidence, and reassess the reconstruction in its new light.

Notes

*I have detailed the nature, scope, and application of **scientific method** in my book *Dead Reckoning: The Art of Forensic Detection*, CRC Press, December, 1999. The book includes concrete examples of the logic essential to the development of scientific explanations by the natural sciences in general and forensic sciences in particular. I have also explained the nature of **scientific method** in two chapters of my book *Forensic Science An Introduction to Scientific and Investigative Techniques*, edited with Stuart James, CRC Press, 2004.

**A simple example of this logic may suffice. Suppose upon entering a room that you see a yellowish-fluid puddle on the white linoleum floor. A small puppy wiggles submissively as it runs up to greet you at the room's entrance. What explains the puddle? The logic relevant to crime scene or event reconstruction is the same logic that licenses your explanation of the puddle. Please note that *mathematical probability DOES NOT play any essential role here*. The process does not involve discovering complex probabilistic relationships allowing us to rank alternative explanations numerically. Instead, the process involves discovering supporting, or refuting *evidence*. Thus it is mistaken to say that one sequence of events is *more likely* than some other. It is correct to say that one sequence of events *best explains* the puddle, given the evidence. Also please note that any explanation offered can be tested in at least one, if not several ways. Given your explanation of the puddle, what tests would you recommend for ruling it in, or tossing it out?

"Bloodstain Pattern Analysis" & Scientific Method

Bloodstain pattern analysis involves the scientific study of the static consequences which result from dynamic blood-shedding events. The study involves analyzing the size, shape, distribution, and pattern of the stains as well as the nature of their target surfaces. The purpose of the study is to help identify the nature of those blood-shedding events that produce the patterns under investigation. A bloodstain pattern analysis, when reasoning beyond specific blood-shedding patterns and their properties, becomes a specific form of crime scene or event analysis and reconstruction. It applies the tools of an event reconstruction, explained above, but focuses specifically upon explaining blood-shedding events at the places and times in question. Evidence includes the number, character, and relationships among bloodstains present at the scene, on the victim and the victim's clothing, on the suspect and the suspect's clothing, on any weapons, vehicles, or other surfaces capable of sustaining bloodstains.

A bloodstain pattern analysis may include the identification of available stains as *human* bloodstains, as blood of a certain human blood type, or even as blood from specific individuals through a DNA analysis of relevant samples. Such analyses are usually provided by qualified serologists and DNA technicians at forensic laboratories. Blood testing has developed great sophistication over the years. [Its history, including presumptive tests for blood, and historically significant tests developed for determining blood type, will be provided only if requested. I also can provide clarifications of relevant terminology therein].

"Ballistics Analysis" & Scientific Method

Ballistics is a branch of classical physics covering the flight of projectiles. The famous American forensic scientist Calvin Goddard [circa 1920s], said to be the 'father of modern ballistics' in the forensic setting, applied the term much more broadly to include the study of firearms as tools which leave distinct marks on the projectiles they deliver. Ballistics, in the forensic setting, as evolved from classical physics, has at least three branches: internal ballistics, or the study of a projectile's movement within a firearm; external ballistics, or the study of a projectile's movement from muzzle to target; and terminal ballistics, or the study of a projectile's movement through a target, usually, but not always, restricted to damage inflicted upon human tissues. [Work within this restriction to human tissues requires further expertise in forensic medicine, which lies beyond the scope of ballistics itself.]

"Ballistics" as an area of forensic science developed by Goddard, however, involves a number of distinct tasks which more properly fall under the heading of "firearms examination." Risking abuse of the term from classical physics, as lamented by Goddard when ruining his choice of the term 'ballistics' to cover such activities, participants in both areas are sometimes referred to as 'ballistics examiners' by the lay public, on television crime shows, and even by attorneys and police detectives.

Besides conducting microscopic comparisons among bullets, cartridge cases, firing pins, gun barrels, and various gun parts, the firearms examiner also studies bullets and cartridge cases to identify the make and model of the weapon which fired them. This

also may involve the disassembly and testing of various firearms and various ammunitions, restoring obliterated serial numbers, or conducting failure analyses when weapons malfunction, causing injury or death

Scientists suitably trained in ballistics and firearms examination also may significantly participate in what I have called crime-scene reconstruction, as described above. This work may involve incorporating research conducted, for example, on the ejection patterns of semi-automatic or fully automatic weapons to help determine the possible positions of shooters using this type of armament while leaving ejected cartridge cases at the resulting undisturbed crime scene, or research on the many principles and properties involved in the areas of internal, external and terminal ballistics

"Ballistics Analysis" & "Gunshot Residue Analysis /GSR Analysis"

Gunshot residue analysis is an area properly related to ballistics and firearms examination, but which overlaps 'trace evidence analysis.' Trace evidence analysis involves the recognition, collection, examination, and identification of microscopic materials usually transferred from one item to another. One such item of trace evidence is gunshot residue

Gunshot residue transfers to items which may be near a firearm during its discharge [AFTE (*Association of Firearm and Toolmark Examiners*) defines GSR as any particulates resulting from the discharge of a firearm including burned and unburned gunpowder, primer residues, and metal particulates, etc.] They consist of burned and unburned gunpowder, lead, copper, or brass shavings from the bullet and its jacket (if present), and residues from the initiating primer, usually antimony, barium and lead. To be typical of gunshot residues, each of these elements, or according to the ASTM (originally, the *American Society for Testing & Materials*), at least antimony and lead, must be fused together in a single particle. The latter are microscopic in size, usually between 0.5 and 5.0 micrometers with some up to 10.0 to 15.0 micrometers or larger. These materials exit from the muzzle and from any other opening in the firearm through which combustion gases may exit, depending upon the weapon's design and condition. Such primer residues, usually antimony (Sb), barium, (Ba), and lead, (Pb), exiting from the sides, top, or bottom of the weapon at issue are commonly distributed toward the shooter's hands and clothing as well as through the muzzle.

GSR exiting from the muzzle, or muzzle effluent, usually exhibits a conical shape. However, most handguns [both pistols and revolvers] – from the smallest 22 cal. through the largest 50 cal. Desert Eagle – distribute *measurable* conical GSR patterns no further than about 36 inches from the muzzle. Several factors influence this distance including the type and load of the cartridge firing the projectile as well as environmental and situational factors. This does not mean, however, that no GSR residues can be found on a target *further* than 36 inches from a muzzle. It does mean that such residues, when present, simply belie assessment as the result of a measurable conical pattern.

When this conical pattern is not disrupted by environmental or situational factors, estimations of the distance between the muzzle and the target can be made by firing the

weapon at issue from specific distances to a clean white target, measuring the dimensions of the resulting residue pattern, and correlating the distances from the target with these dimensions of the resulting residue pattern. The size of this pattern from a measured distance can then be compared with the size of an unknown pattern found at the scene on the victim, and the actual distance from the shooter's muzzle to the victim then can be estimated. This may become impractical, for example, if the actual weapon is not recovered, if it is unavailable or unable to be tested, or if potentially unknown environmental conditions or weapon characteristics adversely effect the typical conical distributions.

Transfer of GSR may occur through mechanisms other than the actual discharge, such as physical contact between a GSR source and the surface upon which GSR is detected. Excessive bleeding also may adversely affect the identification of such residues on any target surface. Residues from muzzle effluent expected on flooring or carpeting may be affected by blood staining, redistributed by foot traffic, or may be disrupted by other factors that ultimately are unknowable to the analyst.

GSR residues exiting the weapon also may be found on the face, hands and clothing of *anyone or anything* near a firearm's discharge, including but not necessarily limited to the shooter himself. They also may be transferred *after* a weapon's discharge through contact with the weapon itself. However the identification of GSR *on the hands* of suspected or even known shooters can prove very difficult in practice. Many laboratories no longer bother to test for such GSR on the hands of suspected shooters since the results, either positive or negative, often may present at-best ambivalent interpretations. Such residues easily can be lost from the hands through sweating and wiping, washing, or through almost any ordinary daily activity. Some shooters may wear gloves protecting their hands from most such deposits. For this reason, hand swabs for GSR detection taken any time other than *immediately* after a shooting, or taken from a deceased shooter who has not moved after potentially discharging a weapon, are seldom productive.

The best evidence for individual GSR residue determinations on individuals remains *the clothing worn by either the victim(s) or the suspect(s) during any shooting. For other analyses, durable items present at the scene provide the best sources for testing.* This gunshot residue may be detected through various scientific means, including chemical, microscopic, photographic, or other instrumental analyses. The choice of testing mechanism(s) ultimately depends upon the nature of the evidence and the need to preserve this evidence through non-destructive testing methods for additional or repeated analyses. It also depends upon the desire to explore potential GSR patterns.

My Assignment in this Case

I was asked to review police, autopsy, and follow-up reports, including scene and autopsy photographs and video, as listed in Appendix I. I also was asked to examine the physical evidence available in the shooting death of Mr. Smith, also listed in Appendix I. After this review of reports and after my scientific analysis of this physical evidence, I was asked to supply any conclusions about Mr. Smith's gunshot wound death that they might

support. These are summarized as 'conclusions.' Some concluding details appear as 'results' under each specific items of evidence discussed below. No assessment or discussion of use-of-deadly-force issues is provided in this report.

Brief Summary of Reported Events

The shooting death of Harry Smith III occurred on September 13, 2003 near 5th and Harrison Streets in Wilmington Delaware. Events apparently began in the early morning of September 12, 2003 when Mr. Smith complained of hearing voices after apparently smoking marijuana which he believed may have been tainted with another drug. His father took him to the emergency room of Wilmington Hospital at 14th and Washington Streets where he received medication and was sent home. He was to return if symptoms worsened.

Early in the afternoon of September 13, 2003, his symptoms worsened and his father drove him back to the hospital, but he refused to enter the emergency room and they returned home. Toward evening, his father again took him to the hospital where he was taken to a triage room. He was quite agitated. When a nurse went for valium, Mr. Smith grabbed a surgical kit, removed a scalpel, and stabbed himself in the chest. His father tried to control him without success. Mr. Smith ran out of the Wilmington Hospital carrying the scalpel

Mr. Smith ran to Washington Street when he attempted a car jacking by threatening a man with the scalpel as the man entered his car. The man locked himself in his vehicle and called 911. These events were witnessed by Wilmington Police Officers Johnny Saunders and Johnny Whitehead who approached in their marked patrol car, #1180.

Officers Saunders and Whitehead approached Mr. Smith on foot, leaving the patrol car running. Mr. Smith ignored commands to drop the scalpel and get down; instead, he approached the officers. The officers retreated. Mr. Smith then entered the patrol car's driver's side door. As he did so, Officer Whitehead fired one round of his 40 cal Smith & Wesson semi-automatic pistol, striking Mr. Smith in the right leg. Smith struggled to get the car in gear, finally succeeding. He drove away southbound on Washington Street at a high rate of speed.

Mr. Smith then led Wilmington Police on a chase through the city. Officer Thomas Dempsey and Detective John Ciritella were in the Wilmington Police Department's central office when they heard the call, entered their cars, and joined the chase. Officer Thomas Dempsey drove a marked patrol car, and Detective John Ciritella drove an unmarked maroon Crown Victoria. Officer Matthew Kurten also joined the chase in a marked patrol car

Mr. Smith turned left onto 5th Street, heading west. Ciritella pulled his unmarked car across 5th Street at Harrison, blocking the northern half of 5th. Kurten pulled his car behind Ciritella's blocking the southern half of 5th. Dempsey stopped his car on Harrison south of 5th Street

Mr. Smith drove down 5th and slowed to an apparent stop, perhaps seeing that his passage appeared to be blocked by the two cars at Harrison and 5th. Detective Ciritella approached the car from the northeast corner sidewalk at 5th and Harrison, identifying himself as an officer and directing Smith to exit the vehicle. Officer Kurten yelled similar directions while Officer Donald Dempsey stopped his car and got out behind Smith. Suddenly, Smith accelerated the car directly at Detective Ciritella. Ciritella fired his 40 cal Smith & Wesson at the patrol car, at one point firing at the passenger side front window from about two feet away as Smith drove by him. Officer Kurten also began to fire toward the rear of the vehicle while Ciritella retreated.

Smith then drove around the corner, striking a white Jeep Cherokee parked on Harrison Street at the Northeast corner of 5th and Harrison, spinning the Cherokee almost 180 degrees while squealing the tires and heading north the wrong way on one-way Harrison Street. Ciritella, Dempsey and Kurten continued to shoot at Mr. Smith

The patrol car continued uphill [up about a 6- to 7-degree slope] on Harrison while Ciritella ran up to the passenger side using the B-pillar for cover. The car slowed to a stop about ½ way up the block. Ciritella then opened the passenger door, reached in, and seeing Mr. Smith slumped toward the passenger side, put the car's shift lever into the 'park' position. At this time, officers opened the driver's side door and removed Mr. Smith, handcuffed him, and began CPR. EMT's arrived shortly; Smith was pronounced dead at the scene.

Summary: Opinions and Conclusions

This report describes a scientific investigation which remains limited to the physical evidence as depicted in supplied photographs and as described in more detail below and as listed in Appendix I.

My opinions are based specifically upon the following:

1. A review of documents including police, autopsy, and shooting review reports, as well as the laboratory reports prepared by the ATF
2. An analysis of the provided scene photographs and scene video
3. An analysis of the provided autopsy photographs
4. A scientific analysis of the physical evidence listed in Appendix I [as noted, as described below in this report, and as documented through notes, photographs, microphotographs, and graphs attached in Appendix II]

My opinions and conclusions are summarized as follows:

1. The data supports the conclusion that one (1) 40 cal shot was fired at Mr. Smith on Washington Street and thirty-one (31) 40 cal shots were fired at Mr. Smith near 5th and Harrison
2. All thirty-two (32) shots fired at Mr. Smith were fired by Wilmington Police

Officers from their duty-issued 40 cal Smith and Wesson semi-automatic pistols firing Federal brand 40 cal S &W JHP (jacketed hollow-point) rounds

3. The one shot fired by Officer Whitehead at the Washington Street scene struck Mr. Smith above the right knee, penetrating downward in his right leg.
4. Mr. Smith struck his left forehead against the upper left corner of patrol car #1180's windshield, cracking the glass, probably when the patrol car's right front end struck the white Jeep Cherokee which was parked on Harrison Street
5. Mr. Smith's blood-soaked shirt transferred blood originating from the scalpel wound(s) to his chest onto the center portion of patrol car #1180's steering wheel, probably when the patrol car's right front end struck the white Jeep Cherokee
6. Two shots fired from behind the rear of Wilmington Police patrol car #1180 entered Mr. Smith's back while he occupied the driver's seat after they each first perforated the Plexiglas slider window which separates the vehicle's rear and front seats
7. One of these shots (entering Mr. Smith's back) fired from behind the rear of the Wilmington Police patrol car #1180 and perforating the Plexiglas slider also perforated the driver's seat head rest before entering Mr. Smith's back
8. Four shots fired by Detective Ciritella struck Mr. Smith – one penetrating the right shoulder, one perforating the right elbow area, one perforating the right wrist, and one penetrating the right side of his head
9. The bullet wound to Mr. Smith's right elbow area shows that his elbow was bent with his right upper forearm touching his right bicep area – in a position suggesting that his right hand was on the steering wheel
10. Arterial bloodstains projected behind and between the front seats on the partition below the Plexiglas slider show that Mr. Smith slumped to his right while his heart was still able to pump blood
11. The trajectory of Mr. Smith's fatal head wound from right to left and the bloodstain patterns in the vehicle between and behind the front seats on the partition both indicate that Mr. Smith's head was in an upright position and looking forward (out the windshield) when he was struck in the head
12. The hemorrhagic wound path of Mr. Smith's fatal head wound from right to left, with subdural and diffuse subarachnoid hemorrhages, shows that he was alive when the fatal wound was inflicted
13. The fatal headshot, the two back wounds, and the two right arm wounds each occurred before Mr. Smith had slumped to his right

14. That officers firing from the rear of patrol car #1180 through the tempered glass rear window and through the Plexiglas slider did not fire and strike Mr. Smith after he was struck in the right side of his head or after he slumped to his right
15. That no police officer fired a weapon from inside patrol car #1180 at Mr. Smith
16. That all Mr. Smith's gunshot wounds were fired from more than three feet (thirty-six inches) away – referred to properly as 'indeterminate range gunshot wounds'
17. That no rounds struck Mr. Smith from the left (or driver's side) of the patrol car
18. That patrol car #1180 driven by Mr. Smith remained in 'drive' and could drift backward after first coming to a stop when facing uphill on Harrison Street if the vehicle's idle were set low
19. That the positions of cartridge cases 30C, 31C, and 32C, ejected from Ciritella's pistol onto Harrison Street, show that patrol car #1180 continued up Harrison Street some distance after these shots were fired and remained up hill from the shooting location even if the patrol car did drift backward after coming to a stop
20. That bystander Marilyn Garcia suffered a single gunshot wound to her left thigh either from a ricochet off the patrol car or from a round which first struck the patrol car's driver's side (and possibly the passenger side) rear window(s)

[Additional detailed conclusions appear below under 'results' sections]

Summary of Scientific Analyses

Item # 1180 – 2002 Ford Crown Victoria Police Interceptor Patrol Car

The vehicle was examined in the Castle Police Garage from 06-14-06 through 06-16-06. The examination included documenting bloodstains, taking samples for trace evidence analysis (glass fractures and gunshot residues), and locating bullet impacts for trajectory analyses. A brief discussion of each follows. Additional documentation appears in Appendix II.

Bloodstain Patterns

Bloodstains on patrol car 1180 were examined, measured, and photographed. Calculations were performed which indicate that given the point-of-convergence and a point-of-origin of approximately 30 to 40 degrees from the impact stains found on the partition between the driver's and passenger's front seat, the decedent was seated upright and facing forward when struck by the bullet producing the impact stains.

Additional bloodstains appear in this location and present arterial flow patterns some of which extend behind the driver's seat. These patterns indicate that the decedent's heart was beating when the blood was projected onto the partition. The presence of brain material and tissue in the flow patterns indicate that the probable source of these arterial projections remains the head wound. The decedent's head would have to be down and to the right toward the center console in order for the projected pattern to appear as documented both between the driver's and front passenger's seats and behind the driver's seat.

Bloodstains appear on the steering wheel's center airbag which indicate that a blood soaked item contacted this portion of the steering wheel. Bloodstains also appear on the driver's seat, floor, under the seat, on the center console, and on the driver's door rocker area.

Non-bullet Impacts on Vehicle Windshield Glass

The front windshield, made of safety glass, has one non-penetrating fracture on the upper left side of the glass. At the center portion of this fracture appears greasy transfer typical of head or forehead contact. At autopsy, a contusion or bruise is described on Mr. Smith's left upper forehead. This bruise remains typical of a strike to the windshield glass as described above. This strike, as well as the contact with the steering wheel, could have occurred as the vehicle struck the white Jeep Cherokee parked on Harrison Street.

Bullet Impacts on Vehicle Windshield Glass

When a bullet strikes laminated safety glass, it can deflect downward as much as 4 to 6 degrees. Therefore it is not the case that bullets perforating safety glass always travel in straight line trajectories. This downward-deflection phenomenon can vary whenever multiple impacts to safety glass create multiple fractures which further weaken the integrity of the windshield. It is not within the scope of standard practice in the fracture analysis of laminated safety windows to determine the order of fractures or perforations by considering intersecting radial/concentric fractures.

Seven bullets strike the vehicle's windshield. Six perforate the glass, while one does not. These strikes are documented in lab notes and photographs appearing in Appendix II.

Tempered Glass Fracture Patterns – Side & Rear Windows

When bullets strike tempered glass, such as glass from side and rear vehicle windows, the first bullet produces both radial and concentric fracture patterns. However subsequent bullet strikes merely perforate the glass without leaving such fracture patterns. Therefore even if the tempered glass remains intact, often the best one can do is to identify the first shot. (See Items # 11 through #14 – glass fragments analyzed – in lab notes).

In this case, however, all the side and rear glass was absent when I conducted my examinations. The locations of some of the tempered glass fragments indicate that all the

tempered windows were broken from the outside inward however it must be noted that tempered glass struck by multiple bullets will send glass pieces both inward *and* outward.

When a bullet strikes tempered glass, it can deflect downward as much as 3 to 5 degrees. It is not possible to determine exactly how many bullets struck the side or rear tempered glass windows – some may have been fired through the opening left after all the glass had shattered. There is no reliable way to count such rounds. However, some estimation is possible given the rear window (see Plexiglas discussion below).

The 40 cal S & W Federal JHP bullet will deform by expanding upon impact with a target such as window glass. When this happens, any secondary target will be struck by a bullet which has expanded. Therefore, typically, the hole left by such an expanded bullet in a secondary target will be bigger than the initial hole in the primary target. Considering both the downward deflection of bullets perforating tempered glass, and the expansion of such bullets upon contact, we can assess the larger holes in the Plexiglas partition as bullets which first struck the rear window and deflected downward, then striking the Plexiglas and leaving a larger hole (see photos in Appendix II).

Bullets leaving smaller holes in the Plexiglas typically did not strike another target prior to striking the Plexiglas. Bullets which struck the vehicle's trunk and ricocheted upward, striking the vehicle's roof from inside the rear compartment also typically did not strike an intact window prior to striking the roof. Other than these general observations, no conclusions can be reached regarding the order of bullet impacts into or through the patrol car's rear window.

Plexiglas Fracture Patterns –Rear Partition Slider

As stated above, bullets passing through the rear window struck the Plexiglas slider separating the vehicle's front and rear seats (see angle calculations and measurements in the lab notes, as well as the photographs, Appendix II). Six bullet strikes perforated the divider (9A to 14A) and two strikes grazed the left driver's side of the structure (27A and 28A). Two of the bullets perforating the Plexiglas slider struck Mr. Smith in the upper back. One of those rounds also perforated the driver's seat headrest. This trajectory was identified and is visualized by a laser (see Appendix II). Also see Item # 15, sample from Plexiglas divider described in Appendix II.

Headliner GSR Analysis

One of the bullets which perforated the Plexiglas slider also perforated the driver's seat headrest. This bullet also struck Mr. Smith in the upper back. The fact that both bullets which struck Mr. Smith's back also first struck at least one other target helps to explain their lack of penetration into the serous cavity. By the time the bullets reached Mr. Smith, they had lost a great deal of their velocity and penetrating power.

Non-bullet Impacts on Vehicle – Right Front Damage

The passenger side front of patrol car #1180 struck the white Jeep Cherokee as described in the reports. White paint transfer appears on the damaged front right quarter of the WPD vehicle (see also scene photos supplied by WPD). The impact area did not extend close to the midline of the vehicle where the airbag deployment sensors activate both driver and passenger side airbags. Neither airbag deployed.

Bullet Impacts on Vehicle

The glass impacts have been discussed above. In that discussion, reference was made to bullet ricochets from the trunk area into the vehicle. Three such impacts occurred to the trunk. One other bullet also produced a ricochet off the vehicle's hood. The bullet impacts are summarized as follows (A typically is an entrance; B typically a second entrance or additional unnumbered perforation):

Number	Location	Type
1A	Hood	Ricochet
2A	Windshield	Perforation
3A	Windshield	Perforation
4A	Windshield	Perforation
5A	Windshield	Impact
6A	Windshield	Perforation
7A	Windshield	Perforation
8A	Windshield	Perforation
9A	Plexiglas	Perforation
10A	Plexiglas	Perforation
11A	Plexiglas	Perforation
12A	Plexiglas	Perforation
13A	Plexiglas	Perforation
14A	Plexiglas	Perforation
15A	Rear Door – Passenger	Perforation
16A	Front Door – Passenger	Perforation
17A	Front Door – Passenger	Perforation
18A	Trunk	Ricochet
19A	Trunk	Ricochet
20A	Trunk	Ricochet
21A	Rear side – Driver	Perforation
22A	Rear side – Driver	Perforation
23A	Rear side – Driver	Perforation
24A	Rear Door – Driver	Perforation
25A	B-pillar - Driver	Impact
26A	Front Fender – Driver	Crease
27A	Plexiglas side - Driver	Crease
28A	Plexiglas side - Driver	Crease

Trajectory Analyses

Each of the above impacts was located in three-dimensional space using an X-Y-Z coordinate system. The front driver's corner (left front corner) of the vehicle was used as the origin of the coordinate system (0, 0, 0 location). The x axis runs from front to rear; the y-axis runs from left side to right side; the z-axis runs vertically (see lab notes for drawings and photos for details). Each impact was given a measurement number representing its location along the x-axis, another number representing its location along the y-axis and a third number representing its location on the z-axis.

Three methods were used to establish the azimuth or y-angle (also known as the impact angle) of each location. These include trajectory rods, lasers, and mathematical methods (see lab notes and photos). The graphical representation of this work remains to be completed. The lateral or x-angle of each location was established using lasers. This location orients each shot in relationship to the established x- axis running from the front to the rear of the vehicle (again, see lab notes, Appendix II)

Vehicle Headliner – GSR Analysis - Items # 1 through #10

In order to determine if a pistol was discharged from inside the front seat area of patrol car #1180, samples from the headliner and sunvisors were taken for laboratory analysis (see description of GSR analysis earlier in this report). Samples were removed from both the driver's side and the passenger side. These locations were chosen given the type of fabric composing headliner material (with a weave/structure suitable to capture primer residues as the identifying element of GSR which helps indicate range-of-fire) and the conical nature of typical muzzle effluent and primer residue discharge from a pistol's slide. In addition, tape lifts were taken of each side of the headliner for analysis.

Each item was analyzed using a digital microscope and XRF elemental analysis. No combination of elements typical of GSR appeared in any of the samples. One can reasonably conclude that no elements typical of GSR primers were present in the vehicle's front headliner area. This supports the conclusion that no pistol was discharged inside the front seating compartment of patrol car #1180.

Mr. Harry Smith III – the Decedent's Clothing

Mr. Smith's white T-shirt, black denim shorts, white boxers, white short socks and DADA shoes were examined for damage and bloodstain patterns. The results are documented in lab notes from page 24 through page 27.

The white T-shirt exhibits 11 holes as measured and documented in the lab notes and photographs. The bloodstain patterns indicate that the shirt was folded up, or wrinkled in various positions when blood was shed and when perforations were made by bullets. Three defects appear in the chest typical of cuts or incisions.

The black shorts exhibit one hole in the right thigh area. They also are blood soaked, and have a white mold indicating that they were perhaps packaged before they were totally dried.

Blood appears on the boxer shorts, the socks, and the shoes. The stains are documented in notes and photographs. The blood on the boxer shorts, on the socks and on the shoes exhibits both contact transfer, and soaking stains typical of blood from Mr. Smith's injuries. Blood was distributed during his removal from the vehicle and his repositioning before and during transport to the medical examiner's facility.

IR Analysis of the Decedent's Clothing

The T-shirt and shorts were examined using an ALS. IR photos were taken with 715 and 680 nm wavelength light. These wavelengths allow visualization of GSR residues since the GSR materials and the surrounding clothing, blood, and other trace materials which may be present have a different color temperature. No GSR appears on either Mr. Smith's T-shirt or on his shorts [See IR photos of Mr. Smith's clothing, both front and rear, in Appendix II]

Firearms Examination: Pistol, Bullets, and Cartridge Cases

The 40 cal Smith and Wesson pistol, serial # SAF 0327 carried and fired by Detective Ciritella, was examined and test fired. The results of the examination are documented in the laboratory notes attached as part of Appendix II. Testing included ejection pattern testing as documented in these notes and photographs.

Ejection Patterns – SAF 0327

Detective Ciritella's pistol ejects spent cartridge cases slightly rearward and to the right. Ejection patterns were tested both by firing single shots, and moving six inches before firing again, and by firing sets of three shots from a single location. The tests were performed on flat concrete. The results appear as follows:

TEST 1: Moving six inches after each shot (accounted for in measurements)			
Round #	Lateral Distance from Slide	Distance to Back or Front of Slide	
1	173"	32"	BACK
2	122"	24"	BACK
3	114"	0"	BACK
4	106"	19"	BACK
5	65"	5"	FRONT
6	77"	47"	BACK
7	69"	52"	BACK
8	114"	121"	BACK

TEST 2: Three shots from a single location

Round #	Lateral Distance from Slide	Distance to Back or Front of Slide
2	38"	96" BACK
1	6"	26" BACK
3	98"	7" BACK
4	6"	23" BACK
5	14"	60" BACK
6	36"	43" BACK

The results demonstrate that this pistol can eject casings in a widely varying way, but the patterns do have certain regularities worth mentioning. When the pistol is held at various distances to the body, the casings sometimes strike the shooter's right chest or shoulder when ejected. Any impact with the shooter will obviously affect their distribution. They also tend to spin or rotate in the air when ejected, and they take time to strike the ground.

The results of these tests help us understand the cartridge case distribution patterns seen on the scene drawing documenting those casings attributed to Detective Ciritella's pistol (see comparisons, below). When fired at a moving target such as the patrol car, the cartridge cases could have struck the patrol car if the car moved from Ciritella's left toward his right as he fired, and/or if he fired with his arms less than fully extended, or if his natural arm-length with gun position permitted the cases to strike his body after ejection.

Cases HL 30, HL 31, HL 32 which were ejected from Ciritella's pistol (see below as well as ATF report which reached the same conclusion) appear to be behind the resting spot of patrol car #1180. Therefore, these rounds were fired before the car came to a stop. Case HL 40 found on the right side of the hood near the wiper and the case in the vehicle passenger area originated from an earlier ejection when the vehicle moved to the right of the pistol as the pistol was fired into the passenger side (see above).

Bullets and Cartridge Cases: From Smith and Wesson Pistol # SAF 0327

Both the test fired cartridge cases from the ATF examination and the cartridge cases produced when Ciritella's pistol was test fired here were compared with the cartridge cases listed above including HL 30, HL 31, HL 32, and HL 40. Comparison microscopy and analysis shows that they were each fired from the same weapon: #SAF 0327.

Both the test-fired bullets from the AFT examination and some of the bullets produced when Ciritella's pistol was test fired here were compared with Item #1 recovered by the Medical Examiner from Mr. Smith. Comparison microscopy and analysis shows that they were each fired from the same weapon: #SAF 0327.

The results of these examinations support the conclusion that a bullet from Detective Ciritella's pistol # SAF 0327 struck and fatally injured Mr. Smith. Detective Ciritella's bullets also struck Mr. Smith in the right arm – in the wrist and in the elbow as well as in the right shoulder.

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Additional Terminal Ballistics

The two bullets striking Mr. Smith's back were fired from the rear and are described separately above. The bullet injury to Mr. Smith's right leg was fired by Officer Whitehead at the Washington Street scene through the open patrol car driver's side door. The injuries to Mr. Smith's chest remain unrelated to bullet wounds.

	06-29-06
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Jon J. Nordby, Ph.D., D-ABMDI
Consultant in Forensic Science & Forensic Medicine

Dated

Appendix I**Materials Reviewed**

Only provided items *directly related to the physical evidence of the shooting* were reviewed.

Files and Transcripts

All materials were provided for this analysis through the offices of Richards Layton & Finger and the physical evidence by the Wilmington Police Department.

Reports

1. Map of area
2. A list of persons involved and a brief description of their roles
3. Report of the Attorney General
4. Report of the City Solicitor; WPD Office of Professional Standards; WPD Internal Affairs
5. The Amended Complaint
6. The Answer to the Amended Complaint
7. Affidavit of David Gwyn
8. Transcript of Deposition of David Gwyn
9. Reports of Officers
 - a. Baylor
 - b. Brown
 - c. Ciritella
 - d. Donald Dempsey
 - e. T. Dempsey
 - f. DiClemente
 - g. Donohue
 - h. Gifford
 - i. Kurten
 - j. Law
 - k. Lawson

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- l Lenhart
- m Misetic
- n Murray
- o Sammons
- p Tolbert
- q Vershofskey
- 10 Notes from interviews of officers Ciritella, T Dempsey and Kurten
- 11 Autopsy report
- 12 Police drawing and measurements at scene
- 13 Wilmington Police Department Property receipt
- 14 ATF report
- 15 A video of the scene taken later in the night of September 13
- 16 Photographs of the scene
- 17 Photographs of car 1180, including photographs of he car with dowels inserted
- 18 Autopsy photos
- 19 Transcripts of the depositions of the three officers

Physical Evidence

Collected during Patrol Car #1180 Examination:

Item # 1 Sun Visor cutting from Patrol Car #1180 (Driver's side)
Item # 2 Sun Visor cutting – Driver's side
Item # 3 Headliner cutting – Driver's side
Item # 4 Headliner – Driver's side
Item # 5 Headliner tape-lift – Driver's side
Item # 6 Headliner tape-lift – Passenger's side
Item # 7 Sun Visor label (Passenger's side)
Item # 8 Sun Visor cutting - Passenger's side
Item # 9 Headliner cutting – Passenger's side
Item # 10 Headliner cutting – Passenger's side
Item # 11 Driver's side door glass (front)
Item # 12 Passenger's side door glass (front)
Item # 13 Passenger's door glass (rear)
Item # 14 Driver's side door glass (rear)
Item # 15 Rear window slider plexiglass sample

1 Box with 2 boxes inside

From: Lt. William R. Browne
Wilmington PD
300 Walnut St.
Wilmington, DE 19801

Box #1

Gun 1 S&W SN# SAF0327
Gun 2 S&W SN# SAF0313
Gun 2 S&W SN# SAF0313
Gun 1 S&W SN# SAF0327
Gun 3 S&W SN# SAF0139
Gun 3 S&W SN# SAF0139
Gun 4 S&W SN# SAF0071
Consistent with Gun 4 S&W SN# SAF0071
Bullet Cores
Fragments

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Box #2

Ciritella WPD# 03055 SN# SAF0327

Kurten WPD# 03063 SN# SAF0313

Dempsey WPD# 03224 SN# SAF0139

Package inside Box # 2

Test Fires

Package inside Box # 2

Bag # 1: HL # 76 Pair of Black "Dada" sneakers with white socks

Bag # 2: HL #77 White t-shirt with orange piece of paper

Bag # 3: HL #78 Black denim shorts and white boxer shorts

Appendix III**Curriculum Vitae**

[Current May 5, 2006]

Jon J. Nordby, Ph.D., D-ABMDIAddress:

Final Analysis Forensics
 3532 Soundview Drive West
 University Place, WA 98466

Email: finalanalysis@msn.comWeb Page: www.finalanalysisforensics.comPhone: 253-627-2739Fax: 253-627-0350Cell: 253-691-2932

Present Positions: Consultant in forensic science and forensic medicine, *Final Analysis Forensics*; Medical Investigator & Forensic Specialist, National Disaster Medical System, DMORT, Region X, Federal Emergency Management Agency FEMA [formerly with the Department of Homeland Security]; Instructor, Washington State Criminal Justice Training Academy [Police – Patrol & Detective Training Facility]

Areas of Practice in Forensic Science & Forensic Medicine

Medico-legal Death Investigation; Bloodstain Pattern Analysis; Ballistics, Firearms & GSR Testing; Trace Evidence Analysis; Crime Scene Investigation & Event Reconstruction

Research1 Publications Including Books

Sleuthing: Method Meets Murder, Jon J Nordby, Ph D Pacific Lutheran University, Tacoma, WA, 1st Edition, 1978

Sleuthing Method Meets Murder, Jon J Nordby, Ph D , assisted by Karen Brandt, Forensic Science Associates, Tacoma, WA, 2nd Edition, 1991

"How Approximations Take Us Away From Theory and Toward the Truth" Nancy D Cartwright, Ph D & Jon Nordby, Ph D , *Pacific Philosophical Quarterly*, July 1983

How the Laws of Physics Lie, written by Nancy Cartwright, with Jon Nordby co-authoring Essay #6, "For Phenomenological Laws," pp. 100-127; further acknowledgment of Nordby in Introduction, pp 1-20; Clarendon Press, Oxford University Press, New York, NY, 1983

Synthese: The Philosophy of Applied Science, Jon Nordby, Ph D & Vivian Weil, Editors, Vol 81, Kluwer Academic Publishers, 1989

"Bootstrapping While Barefoot [Crime Models vs Theoretical Models in the Hunt for Serial Killers]" Jon Nordby, Ph D , *Synthese*, Vol 81, pp 373-389, 1989

"Can We Believe What We See If We See What We Believe? Expert Disagreement" Jon Nordby, Ph D , *Journal of Forensic Sciences*, Vol 37, No 4, July 1992

"Can We Believe What We See If We See What We Believe? Expert Disagreement" Jon Nordby, Ph D , Reprinted, *The International Society of Air Safety Investigators Forum*, Vol 26, No 3, September, 1993

EXHIBIT D

Final Analysis Forensics

Death Investigation Criminalistics Forensic Analysis

July 15, 2006

John Parkins, Jr.
Richards Layton & Finger
920 North King Street
Wilmington Delaware 19801

Reference: Smith v. Wilmington Police Department
Final Analysis Forensics Case #06-0516

Dear Mr. Parkins:

The following presents a supplement to my report concerning the above-referenced case.

In my independent practice of forensic science and forensic medicine, I present scientific results based only upon the available evidence. The results are developed through the application of sound scientific and medical methods applied to all the relevant data according to the best of my ability completely without regard for their potential adversarial consequences.

Direction of Patrol Car 1180 relative to Detective Ciritella

Introduction

Two types of physical evidence support the fact that patrol car 1180 was accelerating toward Detective Ciritella when he fired at the patrol car: first, tire marks left by the vehicle on the pavement; second, the presence in the vehicle of two cartridge cases ejected from Detective Ciritella's pistol, one in the vehicle's front passenger compartment, and one in the vehicle's passenger-side windshield wiper well between the windshield and the hood. Each of these items of evidence entail additional associated facts noted and discussed below.

Tire Marks

The rear wheel drive 2002 Ford Crown Victoria Police Interceptor is equipped with a limited slip differential, option code 45C. This means that when one rear wheel spins, lacking traction, the other rear wheel engages to help propel the vehicle forward. Rubber marks on the roadway near the Jeep indicate that the right rear drive wheel of patrol car 1180 was spinning, leaving rubber on the pavement and tire smoke in the air. To propel the vehicle forward, the left rear drive wheel would engage to grip the road without such slipping. Therefore the vehicle was accelerating, or attempting to accelerate, when in contact with the Jeep. The vehicle's actual speed and direction were influenced by the

need to maneuver between Ciritella's burgundy car, the sign post, and the building on the corner of 5th and Harrison as well as by its eventual contact with the white Jeep, which it pushed approximately 180 degrees up the hill (see tire marks beside the Jeep in the photos appearing below).

Witness Lt. William Browne places patrol car 1180 over the sidewalk on the corner of 5th and Harrison as it drives toward Detective Ciritella, who is standing on the sidewalk near the corner building, in order to avoid officer Ciritella's burgundy police vehicle which is parked across 5th in an attempt to block the roadway. (See photo of Ciritella's burgundy unmarked police car and the corner below).



This WPD photo shows Detective Ciritella's police vehicle and its proximity to the corner. Glass fragments appear beneath the sign post in the photo's left.

The physical evidence indicates that patrol car 1180 was accelerating at the time it contacted the Jeep (see photos of tire marks on Harrison, below). However this contact was not sufficient to deploy the vehicle's airbags. (See further discussion of this fact and its implications below).

[The patrol car's direction of its travel is established by several facts, including the location of Ciritella's burgundy police vehicle, the broken tempered glass found at the corner of 5th and Harrison near the street sign, the impact damage both to the white Jeep and to the patrol car, and the tire marks on the Harrison St. pavement left by the patrol car's right side drive wheel. The location of Detective Ciritella relative to the location of patrol car 1180 is established by the above facts as well as by the location of two spent cartridge cases fired from his 40 cal. Smith & Wesson pistol recovered in the patrol car as mentioned above.]



Arrows indicate general path of patrol car 1180 – there is no room for the car between Ciritella's burgundy vehicle and the corner without jumping the curb and driving on the sidewalk.

Cartridge Cases in Patrol Car 1180

In my opinion, the most reliable scientific data to help establish Detective Ciritella's location relative to the movements of patrol car 1180 involves the two cartridge cases found in the vehicle: one found in the vehicle's front passenger compartment, and one found in the vehicle's passenger-side windshield wiper well between the windshield and the hood.

As previously discussed in my report, the tested 40 cal Smith & Wesson pistol at issue [Detective Ciritella's pistol] generally ejects spent cases backward and to the right. In order for two spent cases to land in the vehicle as noted, the cartridge cases must be in the air above the vehicle as they are traveling to the right and behind Detective Ciritella's firing position and enter the vehicle before they strike the ground. [Or if, as occurred during my testing, a spent case hit Detective Ciritella and bounced off him, then they would bounce into the air very near his location (and the vehicle would be very near him indeed)].

In addition, for a casing to land inside on the front passenger seat, the right side passenger window had to be broken by prior bullet impact. The other casing landed in the right side wiper recess behind the hood. Therefore, under either ejection scenario, the vehicle was

moving both toward Detective Ciritella and past his right side toward his back when the cartridge cases were deposited in the vehicle.



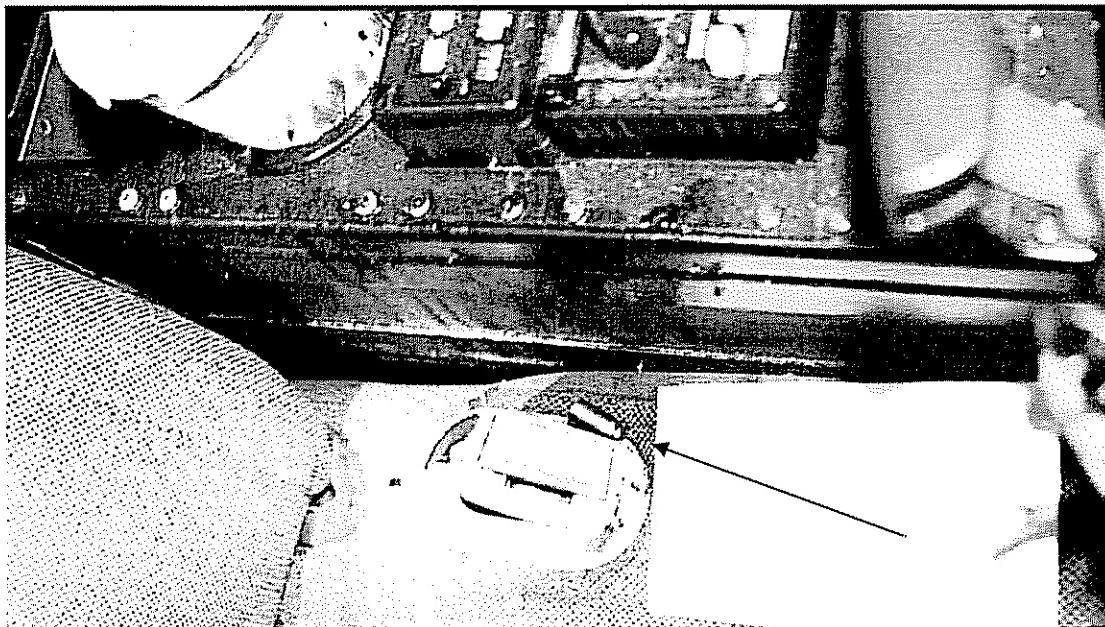
The officer is pointing to glass from patrol car 1180's tempered glass side windows which were broken by bullet impacts probably from Detective Ciritella's pistol – the patrol car would have gone directly toward Ciritella's stated position before veering left to strike the white Jeep's left front end with its right front end.

Since no gunshot residues inside the car and no injuries to the decedent indicate that a weapon was fired from inside patrol car 1180 (see my report), the two cartridge cases from Detective Ciritella's pistol had to strike the vehicle when it moved both toward the right side of Ciritella's pistol and into the path of the ejected rounds before they could hit the ground. [Note that the upward slope of Harrison St. (a slope of about 6 to 7 degrees) would have no bearing on the two cartridge case's final resting spots since they could not have both hit the ground and landed where recovered in the vehicle.]

This data supports the conclusion that the vehicle was moving toward Detective Ciritella onto the sidewalk when he fired at least these two rounds at the car and probably when he fired one prior round which broke the front passenger side window leaving the glass fragments pictured above (tempered glass will shatter sending some glass in the direction of initial impact).

The location of the glass fragments clearly places the patrol car on the sidewalk. Ejection pattern testing discussed in my report shows that the cartridge cases ejected during rapid fire would land in the vehicle no further than 98" and no closer than 6" from the pistols

slide (see report). Note that these distances will actually be less since the vehicle is moving toward the pistol and toward its right side as the cartridge cases are in the air.



The 40 S&W cartridge case from Detective Ciritella's pistol is indicated by the arrow. The mechanism of its deposition is discussed above.

Non-deployment of Patrol Car 1180's air bags upon impact with the Jeep

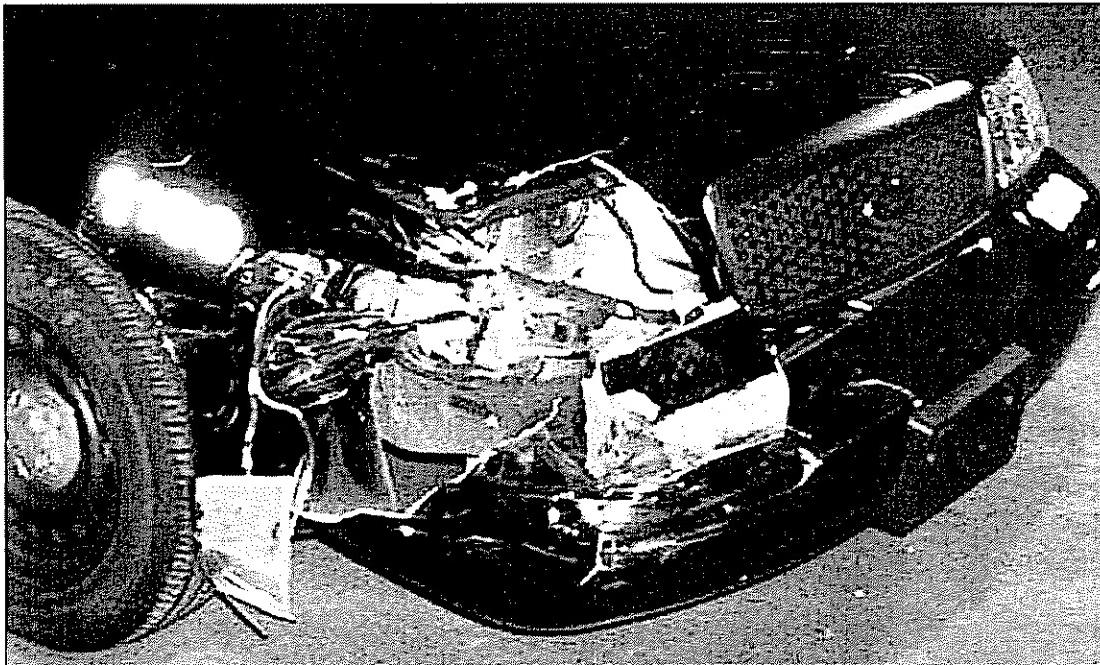
Air Bag Deployment

Air bags on the Ford Crown Victoria Police Interceptor are designed to deploy upon front-end impact. Both the location and the nature of the impact influence air bag deployment. Some police vehicles have after market air bag switches to disable air bag deployment. WPD patrol car 1180 did *not* have such a switch.

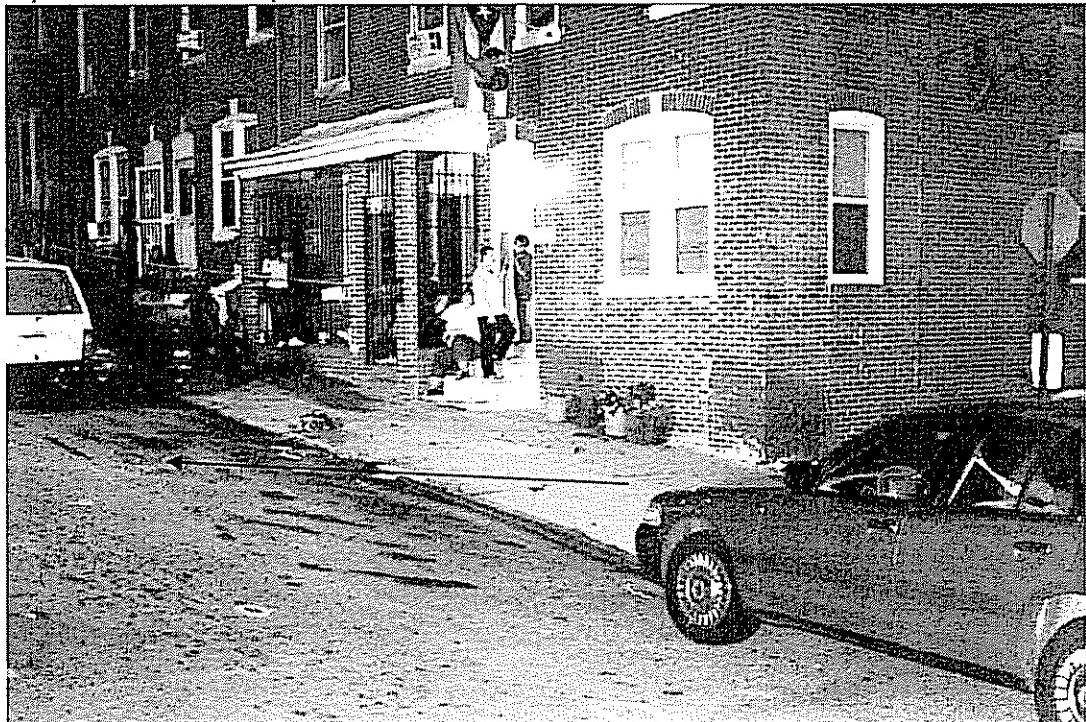
The damage to patrol car 1180 appears on the right side front. Patrol car 1180 struck the white Jeep Cherokee with its right-front fender, not with its front bumper. While striking the Jeep, the patrol car obviously did not produce an impact force sufficient to activate the airbag's switch associated with the front bumper. Crown Victoria Police Interceptors [CVPI's] airbag switches are located on the frame rails and activated by sensors on the front frame member associated with the front bumper. However, regardless of its velocity, patrol car 1180 did not strike the white Jeep in a location which would deploy the airbags. The lack of air bag deployment, therefore, is not a reliable measure of the vehicle's impact speed but instead indicates location of impact on the patrol car.

The Ford CVPI is designed with 'crumple zones' which absorb impacts in turn to prevent injury to occupants. When patrol car 1180 struck the white Jeep, it struck such a crumple zone on the right front fender (see photo below). The impact did not involve the front bumper in any manner sufficient to activate the air bags. Therefore the non-deployment

of the air bag is best explained by the fact that the impact angle with the white Jeep involved a crumple zone designed to 'give' in a crash and did not involve a force measured by the air bag sensors associated with the front bumper.



Damage to patrol car 1180 shows the effective design of the crumple zone and the lack of significant impact with the front bumper.

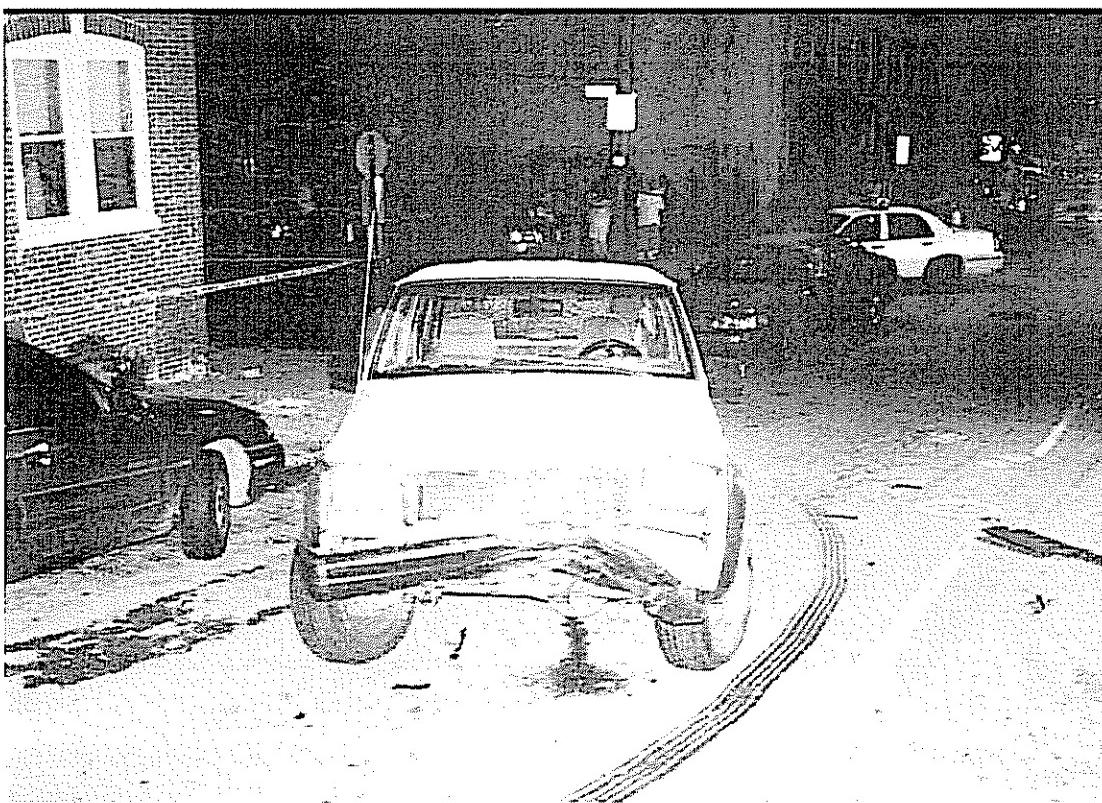


The white Jeep, originally parked facing down hill on Harrison St [a one-way street], was pushed by patrol car 1180 about 180 degrees to face up hill on Harrison St – the patrol car struck the Jeep from the sidewalk

contacting the Jeep's left front end with its right front end. The melted tire tracks left by the patrol car indicate that the vehicle was accelerating as it pushed the Jeep around (see second photo above and photo below). The arrow indicates the general path of patrol car 1180 off the sidewalk and onto Harrison St.



The tire marks go past the Jeep and were left by patrol car 1180's right rear drive wheel indicating that the car continued to accelerate after moving the Jeep. Tempered glass fragments from patrol car 1180's side and possibly rear windows appear in the middle of Harrison, as indicated by the arrow.



Note the tire marks from patrol car 1180's acceleration – also note the 'Club' security device which locked the steering wheel of the white Jeep into the 'tires-toward-the-curb position.'

Conclusions

The physical evidence indicates that patrol car 1180 drove onto the sidewalk at the corner of 5th and Harrison, struck the white Jeep moving it about 180 degrees while accelerating up Harrison St. going the wrong way on the one-way street. It indicates that Detective Ciritella fired at the patrol car* as it moved toward his position on the sidewalk, sufficiently close to deposit glass from the passenger side front window onto the sidewalk and to deposit two of his ejected 40 cal S&W cartridge cases into the patrol car.

*[It should be noted that the impacts to the windshield may not all be entrance impacts – some may be impacts from projectiles exiting the Plexiglas partition. Safety glass is not amenable to conchoidal fracture analysis as is plate or tempered glass.]

The physical evidence indicates that the airbags in patrol car 1180 did not deploy because the front sensors were not activated: instead, the right front fender absorbed the impact with the white Jeep, crumpling as designed to protect vehicle occupants. Therefore the velocity of impact is not reliably measured by airbag performance in this case.



07-15-06

Jon J. Nordby, Ph.D., D-ABMDI
Consultant in Forensic Science & Forensic Medicine

Dated